

SOP 138-47HV

OPERATION, PREVENTIVE MAINTENANCE, AND INSPECTION OF HIGH PRESSURE BOILERS

VA Hudson Valley Health Care System

Issue Date: July 30, 2013

Update: July 30, 2016

1. **PURPOSE:** To ensure boilers are providing required service to the Health Care System.

2. **POLICY:** Engineering Service has implemented mechanisms to ensure that all high-pressure boilers and associated equipment are operating safely and efficiently.

3. RESPONSIBILITIES:

a. **The Chief, Engineering Service** is responsible for ensuring the implementation of this policy.

1) Is responsible for reporting any safety devices that malfunction to the Director of the facility.

b. **The Utility Systems Operations Supervisor** is responsible for ensuring that:

1) All preventive maintenance is performed and properly documented.

2) All records include: shift, daily, monthly and annual calculations of boiler efficiency, use of: fuel, water, electricity, minimum and maximum steam demand, total steam production, ambient temperature, and degree days.

3) Is responsible for reporting any safety devices that malfunction to the Chief Engineer.

c. **Utility Systems Operators** are responsible for not leaving any high pressure (15 psig or greater) boiler unattended at any time, nor should they be relieved by unqualified persons even for short periods.

4. PROCEDURES:

a. Any unusual occurrences as a rupture or explosion of a boiler or pressure vessel, a furnace explosion, extensive damage from overheating, or any other unusual condition will be reported immediately to VA Headquarters. A thorough investigation of the cause and extent of the damage will then be performed by the facility and a written report submitted as soon as possible.

b. Preventive maintenance inspections will be performed by qualified personnel only. The following inspection will be made:

1) Water Treatment: Samples will be taken and tested daily. Results are maintained in the plant.

- 2) External Boiler Inspection: Inspections will be conducted annually by an outside agency. Results are maintained in the plant.
 - 3) Internal Boiler Inspection: Inspections will be conducted annually by an outside agency. Results are maintained in the plant.
 - 4) Safety Test: Before any Boiler is placed into service, all safety devices shall be tested, i.e.: High Water and Low Water Alarms and Cut Off, Flame Failure Test, and High Limit Cut Off. Results shall be recorded in Daily Log Book.
 - 5) Inspections required by VHA Directive 2008-062 are included in Attachment "A."
- c. Provide training of "safe steamin" course as per VHA Directive 2010-031 for Boiler Plant Operators, Supervisors, and Managers of the Boiler Plant.

5. REFERENCES:

DMS&S Supplement MP-3
VHA Directive 2008-062
VHA Directive 2010-031

6. RESCISSIONS:

SOP 138-47HV, Operation, Preventive Maintenance, and Inspection of High Pressure Boilers, dated July 8, 2010.

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Attachment A: Required Inspections and Operational Tests

(a) Key to Frequency Abbreviations

1. H = Hourly.
2. D = Daily.
3. M = Once per month.
4. 6M = Once every 6 months.
5. Y = Once per year.
6. 6Y = Once every 6 years.

(b) Frequency Chart

ITEM	FREQUENCY
<u>1.</u> High pressure boilers (above 15 psig): inspect furnace and other internal surfaces, closures and accessories.	Y
<u>2.</u> High pressure boilers (above 15 psig): inspect exterior of unit, casing, supports, closures, accessories, valves, controls.	Y
<u>3.</u> Deaerator: inspection and wet magnetic particle testing of welds of pressure vessel interior.	6Y
<u>4.</u> Boiler fouling and combustion gas flow check.	Y
<u>5.</u> Tube leak check.	Y

NOTE: The items preceding (1. through 5.) must be accomplished by a Qualified Professional Inspector. The following items (6. through 00.) must be accomplished by a qualified individual as determined by the medical center’s management. Such a determination must be carefully made for each item and each individual.

ITEM	FREQUENCY
<u>6.</u> Low pressure boilers (15 psig and below): inspect interior in addition, exterior, supports, closures, accessories, valves, and controls.	Y
<u>7.</u> Deaerator: interior cleaning and visual inspection.	Y
<u>8.</u> Adjust burner combustion settings and calibrate oxygen trim.	6M

<u>9.</u> Check vibration of burner fans.	6M
<u>10.</u> Calibrate instrumentation, monitoring, and control systems.	6M
<u>11.</u> Calibrate pressure gages and thermometers.	Y
<u>12.</u> Operational Testing of Boiler Safety Devices:	
<u>a.</u> Low-water cutoff (slow drain)	M
<u>b.</u> Low-water cutoff shunt switch	M
<u>c.</u> Auxiliary low-water cutoff (slow drain)	M
<u>d.</u> Auxiliary low-water cutoff shunt switch	M
<u>e.</u> High-water alarm	M
<u>f.</u> Low-water alarm	M
<u>g.</u> High-steam pressure cutout (recycle)	6M
<u>h.</u> High-steam pressure cutout (non-recycle)	6M
<u>i.</u> Steam safety valves (raise boiler pressure until valve pops)	6M
<u>j.</u> Steam safety valves (accumulation test at high fire)	Y
<u>k.</u> Flame scanner	M
<u>l.</u> Check gas vent for leaks	6M

<u>ITEM</u>	<u>FREQUENCY</u>
<u>m.</u> High-gas fuel pressure cutoff	6M
<u>n.</u> Low-gas fuel pressure cutoff	6M
<u>o.</u> Gas fuel safety shut off valves proof of closure	6M
<u>p.</u> Leak test gas fuel safety shut off valves	6M
<u>q.</u> High-fuel oil temperature cutoff (heated fuel)	6M
<u>r.</u> Low-fuel oil temperature cutoff (heated fuel)	6M
<u>s.</u> Low-atomizing pressure for fuel oil	6M
<u>t.</u> High-fuel oil pressure cutoff	6M

<u>u.</u> Low-fuel oil pressure cutoff	6M
<u>y.</u> Fuel oil safety shut off valves proof of closure	6M
<u>w.</u> Leak test fuel oil safety shut off valves	6M
<u>x.</u> Check operation of Liquid Petroleum Gas pilot	6M
<u>y.</u> Low-pilot gas pressure cutout	6M
<u>z.</u> Forced draft fan motor interlock	6M
<u>aa.</u> Forced draft fan damper wide open for purge	6M
<u>bb.</u> Boiler outlet damper wide open for purge	6M
<u>cc.</u> Purge air flow interlock	6M
<u>dd.</u> Timing for prepurge	6M
<u>ee.</u> Timing for post purge	6M
<u>ff.</u> Igniter timing	6M

<u>ITEM</u>	<u>FREQUENCY</u>
<u>gg.</u> Low fire position interlock	6M
<u>hh.</u> Combustion air interlock	6M
<u>ii.</u> Main flame out; i.e., time to close valves	6M
<u>jj.</u> Ignition flame out; i.e., it is time to close valves	6M
<u>kk.</u> Minimum igniter flame test	6M
<u>ll.</u> Scanner not sensing ignition spark	6M
<u>mm.</u> Low-oxygen alarm and/or cutout	6M
<u>nn.</u> Prepurge setting of flue gas recirculation damper	6M
<u>oo.</u> Interlock of building outside air damper with burner control	6M

NOTE: The preceding safety devices are essential for ensuring the safest possible operation. Any boilers not so equipped must be immediately programmed for retrofit, with

priority given to providing two low water cutoffs per boiler and two fuel safety shut off valves per fuel per boiler.

13. Boiler Plant Safety and Operational Duties

<u>ITEM</u>	<u>FREQUENCY</u>
a. Overall plant operation	H
b. Blowdown water columns	D
c. Testing and adjusting water treatment	D
d. Check furnace pressure	6M
e. Check combustion gas leaks into boiler room	6M
f. Clean waterside of boilers	Y

<u>ITEM</u>	<u>FREQUENCY</u>
g. Clean fireside and repair refractory	Y
h. Operation of deaerator high and low water alarms	M
i. Operation of deaerator steam pressure/temperature control	M
j. Operation of condensate storage tank high and low water alarms	M
k. Operation of all other alarm devices	M
l. Operation of boiler economizers; temperatures in or out	D
m. Review written procedures	6M

NOTE: The inspection and testing schedule is required for boilers in service during the period. Boilers not in service must be inspected and tested prior to placing in service. For boilers in service less than 3 months during the period, the schedule of inspections and tests performed by qualified technicians for burner-related functions may be extended to not exceed 1 year.